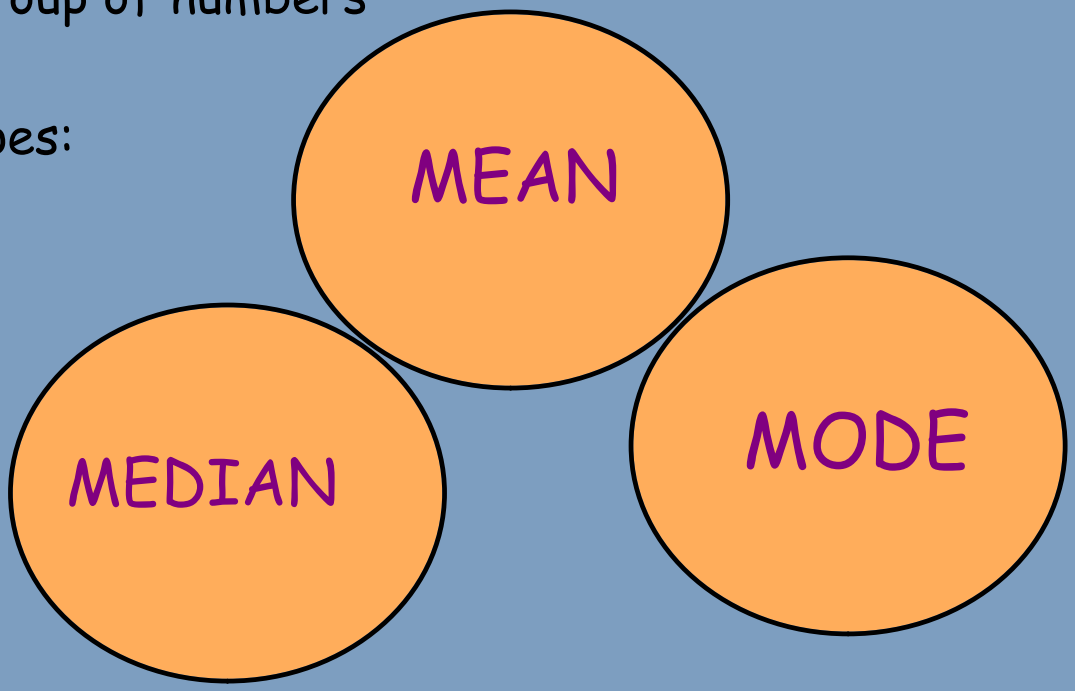
1.3 Describing Data

Curriculum Outcomes	Related Activities	Page in Text
• calculate various statistics using appropriate technology, analyze and interpret the displays, and describe the relationships	• review computation and use of mean, median, and mode	15
	• determine the best average to use to describe a set of reaction time measurements	16
• calculate and apply mean and standard deviation using technology to determine if variation makes a difference	• determine data values that can be treated as unusual, or outliers, and look at ways to handle them	15
	• explore the limitations of using one piece of information to describe a set of data	17
• create and analyze plots using appropriate technology • make and interpret frequency bar graphs while conducting experiments and exploring measurement issues	• interpret, create, and consider uses, advantages, and disadvantages of different graphs, that is, stem-and-leaf plots, box-and-whisker plots, frequency tables, histograms	26
	• consider appropriate data grouping to create histograms	22
• analyze statistical summaries, draw conclusions, and communicate results about distributions of data	• use the shape of a graph to determine an informal measure of the spread or distribution of the data	22

Measures of Central Tendency

- ways to identify one number that characterizes a group of numbers

- Types:



MODE

- the number that appears most often in a set of data.
- there can be more than one mode in a set of data.

Example:

Find the mode of this group of numbers.

20, 19, 26, 18, 26

Step 1: Arrange the numbers from least to greatest.

18, 19, 20, 26, 26

Step 2: Find the number that is repeated the most

18, 19, 20, 26, 26

The mode is 26.

MEAN

- the sum of a set of numbers; divided by the total number of numbers in the set. (average)
- Symbol = $\overline{X}$
- Equation = $\overline{x} = \frac{\text{sum of values}}{\text{\# values}}$ $\overline{x} = \frac{\Sigma}{\text{\# values}}$

Example:

Find the mean of the group of numbers:

7, 11, 12, 18, 23, 25

Step 1: Add all the numbers.

7 + 11 + 12 + 18 + 23 + 25 = 96

Step 2: Divide the sum by the number of items.

96 ÷ 6 = 16

The mean is 16.

MEDIAN

- the middle value or midpoint of a set of numbers arranged in order

Example:

Find the median of a group of numbers.

20, 19, 23, 18, 26

Step 1: Arrange the numbers from least to greatest.

18, 19, 20, 23, 26

Step 2: Find the middle number.

18, 19, 20, 23, 26

The median is 20.

What happens when there is 2 middle numbers??

Example:

~~18~~, ~~19~~, 20, 22, ~~23~~, ~~26~~

Step 3: Find the mean of the two middle numbers.

$$20 + 22 = 42$$

$$42 \div 2 = 21$$

The median is 21.

Warm-up #5

Copy and Complete.

Find the mean, median, and mode of the following set of data (Show your work):

5, 25, 22, 32, 10, 25, 21, 27, 29, 39, 22, 25, 21, 22

Warm-up #5

Copy and Complete.

Find the mean, median, and mode of the following set of data (Show your work):

5, 25, 22, 32, 10, 25, 21, 27, 29, 39, 22, 25, 21, 22

Mean = 325 ÷ 14 = 23.2 /2

median = $\frac{22+25}{2} = \frac{47}{2} = 23.5$ /2

mode = 22, 25 /1

/5

Outliers

- Values that are significantly different ("lie outside") from the majority of a set of data.
- They can affect the mean.

Example

What would the outlier of this data be?

4cm, 6cm, 5.3cm, 10.7cm, 3.2cm, 4.6cm, 6.6cm

The outlier is 10.7cm

Range

- the smallest number subtracted from the largest number

Example

What would the range of this data be?

8, 10, 6, 9, 8, 7

Largest = 10

Smallest = 6

10 - 6 = 4

The range is 4

Homework

COPY THIS DOWN

Find the mode, mean & median for each of the following:

1. 5, 12, 12, 28, 23, 31
2. 50, 67, 79, 45
3. 4, 1, 7, 3, 1, 4, 8, 9, 9
4. 25, 25, 25, 29, 27, 27

Homework

ANSWERS

Find the mode, mean & median for each of the following:

1. 5, 12, 12, 28, 23, 31
2. 50, 67, 79, 45
3. 4, 1, 7, 3, 1, 4, 8, 9, 9
4. 25, 25, 25, 29, 27, 27

Investigation #2
p.14

- We are going to do this activity in pairs ----> don't get into pairs until after we have gone over instructions!!

Purpose

To communicate your reaction time to an event.

Investigation #2 p.14

Procedure

- Assign one person (A) to hold a ruler straight up and down at the "30 cm" end with the "0 cm" end nearest to the floor
- The other person (B) holds their forefinger and thumb on either side of the ruler at the "0 cm" end.
- Person A drops the ruler without warning for person B to catch between the forefingers and thumb.
- Record, to the nearest millimetre, where the higher edge of the forefinger is on the ruler after the catch.
- Repeat the ruler drops twenty times.
- Switch positions so that person B now drops the ruler and drop the ruler another twenty times.
- RECORD your data in a chart in your book

Each person must make a table similar to this one in their notes

Results

Drop Number Person A (name)	Catch Height (cm) Person A (name)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Drop Number | Catch Height (cm)

Investigation #2 p.14

Results

Drop Number | Catch #.

#1-20

Questions:

Each person must do these questions with their 20 pieces of data

- Complete questions 1 & 2 on page 15
- Complete the following using the chart made for the 20 trials:

Calculate the mean, median, and range of the 20 reaction times

MEAN -> (sum of all the reaction times)/20 = ☐

MEDIAN -> the middle value when all values are lined up least to greatest = ☐

RANGE -> (Maximum value) - (Minimum value) = ☐

- Does your data have any outliers? State why or why not.
- Does your data have a mode(s)?

- Please finish your Investigation #2 (Table and Questions)

-if you weren't here you need to come in at lunch to get instructions and then pass it in asap

- Also, have out your homework questions
- Reminder: If you haven't written the 1.1 & 1.2 Quiz yet, you MUST write it today at lunch!

Warm-Up

Find the mean, median, mode, and range for each of the following:

1. 12, 4, 6, 8, 3, 6

2. 6, 1, 7, 4, 1, 4, 0, 9

What central tendency do we use to describe our data?

- We must be careful which means of central tendency (mean, median or mode) we are going to use to find the average of a set of data.
- Not every average will give us accurate information for analyzing.

When Mean is best:

- When the difference between the highest and the lowest piece of data is not a large difference.
- No outliers present

Example:

~~The gas prices at three different stations were recorded and the following information~~ was found:

Station #1 - $1.24/L
Station #2 - $1.23/L
Station #3 - $1.25/L

When Median is best:

- When data is clustered closely together
- Can be used when there are outliers

Example:

There are four houses being sold in the same subdivision. They are all approximately the same age, and style. Their prices are below:

House #1: $150,000
House #2: $155,000
House #3: $149,000
House #4: $180,000

** We see that there is an over priced house (an outlier) because of this we can not use the Mean as it would skew it so a Median should be used **

When Mode is best:

- rarely used
- specific to data that can be grouped

Example:

The number of children in a family was recorded for 10 families and the following data was collected.

1, 4, 3, 4, 2, 1, 3, 2, 3, 2

** Here we can group the data into families with 1 child, 2 children, 3 children, 4 children, etc. By doing this we can see what the most frequent number of children in a family are **

Please take out your homework
Pg.16 #3
and
3 board questions

Questions:

Complete questions 3 and 4 on page 16.

Mean - close together, no outliers
Median - can have outliers
Mode - group, survey, count

3. a) 2, 2, 12, 13, 14, 15, 16, 17, 18 (pencil length cm)

outliers?? ∴ yes median = 14 Not mode

b) 90, 100, 110, 120, 130, 140, 150, 160, 170 (duration of phone calls, s)

no outliers Mean = 130s grouped

c) 5, 6, 6, 6, ,7, 7, 8, 9, 12 (shoe sizes) Mode = 6

Copy and Complete

For each of the following situations, state what the most useful average measure is and explain why. Solve for the average.

Situation 1: Nick surveyed the men in the class in regards to the size of their shoes and obtained the following data:

7, 11.5, 8, 8.5, 9, 12, 7.5, 8, 9, 7, 9

Mode = 9

Situation 2: Rob recorded his golf scores over 7 games.

96, 92, 64, 101, 95, 93 Median = 94

64 92 93 95 96 101

Situation 3: Maggie compared the prices of one brand of DVD players at different stores.

$ 409, $399, $429, $439, $399, $429, $419, $389

Mean = $414